Low Effort Crowdsourcing: Leveraging Peripheral Attention for Crowd Work

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Abstract

Crowdsourcing systems leverage short bursts of focused attention from many contributors to achieve a goal. By requiring people's full attention, existing crowdsourcing systems fail to leverage people's cognitive surplus in the many settings for which they may be distracted, performing or waiting to perform another task, or barely paying attention. In this paper, we study opportunities for *low-effort crowdsourcing* that enable people to contribute to problem solving in such settings. We discuss the design space for low-effort crowdsourcing, and through a series of prototypes, demonstrate interaction techniques, mechanisms, and emerging principles for enabling low-effort crowdsourcing.

Introduction

While many crowdsourcing systems are designed to support short-term interactions, they still require contributor's full attention. We consider cases of cognitive surplus for crowdsourcing, where potential contributors are in settings with another task or distraction, but have attention to spare for an auxiliary task (e.g., waiting for a page to load in a mobile browser). Such scenarios demand people's attention in ways that limit their capacity for complex problem-solving. Leveraging any cognitive surplus people may have in such settings thus requires accounting for people's situational context, and introducing novel interaction techniques and mechanisms that can enable effective contributions in spite of it.

We explore opportunities in *low-effort crowdsourcing* that enable crowd contributions without workers' full attention. We propose that low-effort crowdsourcing is possible through a mix of *an appropriate setting*, *low-granularity tasks*, and *unobtrusive input methods*. We take particular advantage of incidental and peripheral forms of contribution that arise naturally or can otherwise be embedded within an existing interaction (e.g., *emotive voting* in Figure 1). Some principles of low-effort crowdsourcing have been explored in prior work, such as Twitch (Vaish et al. 2014). We attempt to formalize

Figure 1: With a camera, the *emotive voting* interface 'likes' an image if you smile while the image is on the screen, and 'dislikes' if you frown.

the concept, exploring the design space for low-effort crowd-sourcing and present a series of proof-of-concept prototype systems.

Design Space

We explore three dimensions of design space for low-effort crowdsourcing: *settings*, *tasks*, and *input methods*.

Settings. Workers cognitive surplus allows them to choose to contribute to another task in the periphery of their primary task.

Waiting: When people are waiting, there are often periods of 'dead time' during which people cannot usefully switch context to perform a significant task. By inserting microtasks into such periods of waiting, we could elicit useful work while alleviating people's downtime.

Multitasking: When performing primary tasks with low demands on cognitive load (e.g., walking), people are most likely to have the cognitive surplus to contribute to another task.

Task Design. Our prototyping experience and exploration into appropriate settings for low-effort crowdsourcing revealed a number of considerations for the design of such interactions:

Low time commitment and cognitive load: As interruptions can easily get in the way of the primary tasks people are trying
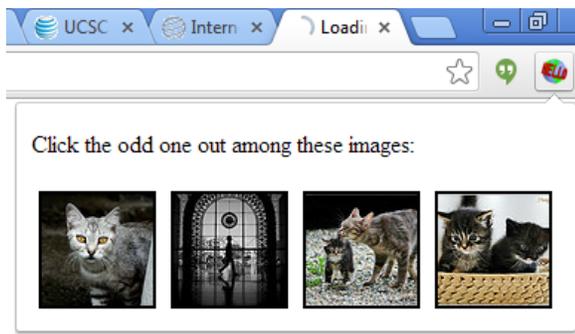
Figure 2: Wait Extension: a Chrome extension that allows users to perform simple tasks while a page loads.

to complete (McFarlane and Latorella 2002), tasks should be broken down into micro units that can be completed very quickly and demand low cognitive load.

Enhance the primary experience: Tasks should strive to enhance people's primary task experience, for example, by filling in for dull moments and dead time.

Leverage the primary experience: Tasks can potentially take advantage of what people are already doing through their primary task, and provide a medium for contributing that didn't previously exist.

Input methods. In our prototypes, we introduce interaction techniques that take particular advantage of activity sensing and input technologies that are available ubiquitously through mobile and wearable devices. To account for people's situational, social and physical restrictions, we can embed task information within visual, audio, and haptic feedback.

Prototype Examples

Based on our understanding of design challenges and opportunities from our exploration of the design space, we developed five prototype low-effort crowdsourcing applications. These applications demonstrate interaction techniques and mechanisms for enabling participation in low-effort crowd work in a variety of scenarios.

Wait Extension: To leverage users' dead time in web browsing, we developed *Wait Extension* (Figure 2), a Chrome browser extension that allows users to perform simple tasks while they are waiting during slow page loads and video ads. Wait Extension prefetches crowdsourcing tasks that can be completed quickly, with low cognitive load. In our prototype, users of the extension choose the odd picture among a set of images along the lines of Matchin (Hacker and Von Ahn 2009), which can be useful data for developing computer vision algorithms. In doing so, inserted crowd work interrupts the user no more than they are already being interrupted by the wait.

Knock for Good: We developed *Knock for Good*, a prototype mobile app that allows users to report local problems on-the-go by simply knocking on their phone. This physical action allows a user to report the locations of problems on-the-go, without having to take out their phone or having to stop to interact with the phone directly. By using physical gestures, the application can significantly reduce the time, effort, and interaction required to make a useful contribution.

Emotive voting: Using a camera, *emotive voting* (Figure 1) collects information on funny and salient images through people's natural emotion response. To do this, the system displays a scrolling stream of potentially funny images and continually observes a user's facial expression. When a user smiles or laughs, the systems takes this emotional response as a vote that the image they are viewing is actually funny. Emotive voting demonstrates the idea of *capturing people's natural and instinctive reactions as useful input for crowd work*. Since people need to only glance at a display to provide useful data, the demands on their attention and effort are minimal.

Awesomer Meme: The *Awesomer Meme* prototype deliberately pushes the concept of low-effort crowdsourcing to an extreme degree, asking whether a person in a conversation can passively use coded conversational responses to also perform small tasks. Awesomer Meme uses a verbal modality as input, ranking images by listening to a person's affirmative or dissenting grunts.

Binary Tweet: For the *Binary Tweet* prototype, we explore ways to enable people to communicate a complex idea through low-fidelity input. Using the Twitter API for a colloquial corpus, we built a variant of an $n + 1$ markov model. A user types in a seed word and the next word is suggested. In general, we hypothesize that low-fidelity input mechanisms for enabling rich communications can foster flow as well as enable users to participate in situations where richer input modalities are unavailable, and through devices for which low fidelity input is standard (e.g., a smartwatch).

Conclusion and Future Work

Low-effort crowdsourcing can extend and be applied beyond the examples discussed in this paper. Based on our research findings and experience while exploring prototypes, we learned that its possible to crowdsource tasks using peripheral attention of crowd. In the process of exploration, our prototype designs addressed the scope of design space - settings, tasks and input methods.

In future work, we plan to deploy our prototypes in real world setup and conduct an exhaustive study to continue making progress in the area. Our attempt would be to incorporate our learnings and address current limitations to make user experience as seamless as possible, and to encourage longevity of ubiquitous engagement.

References

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